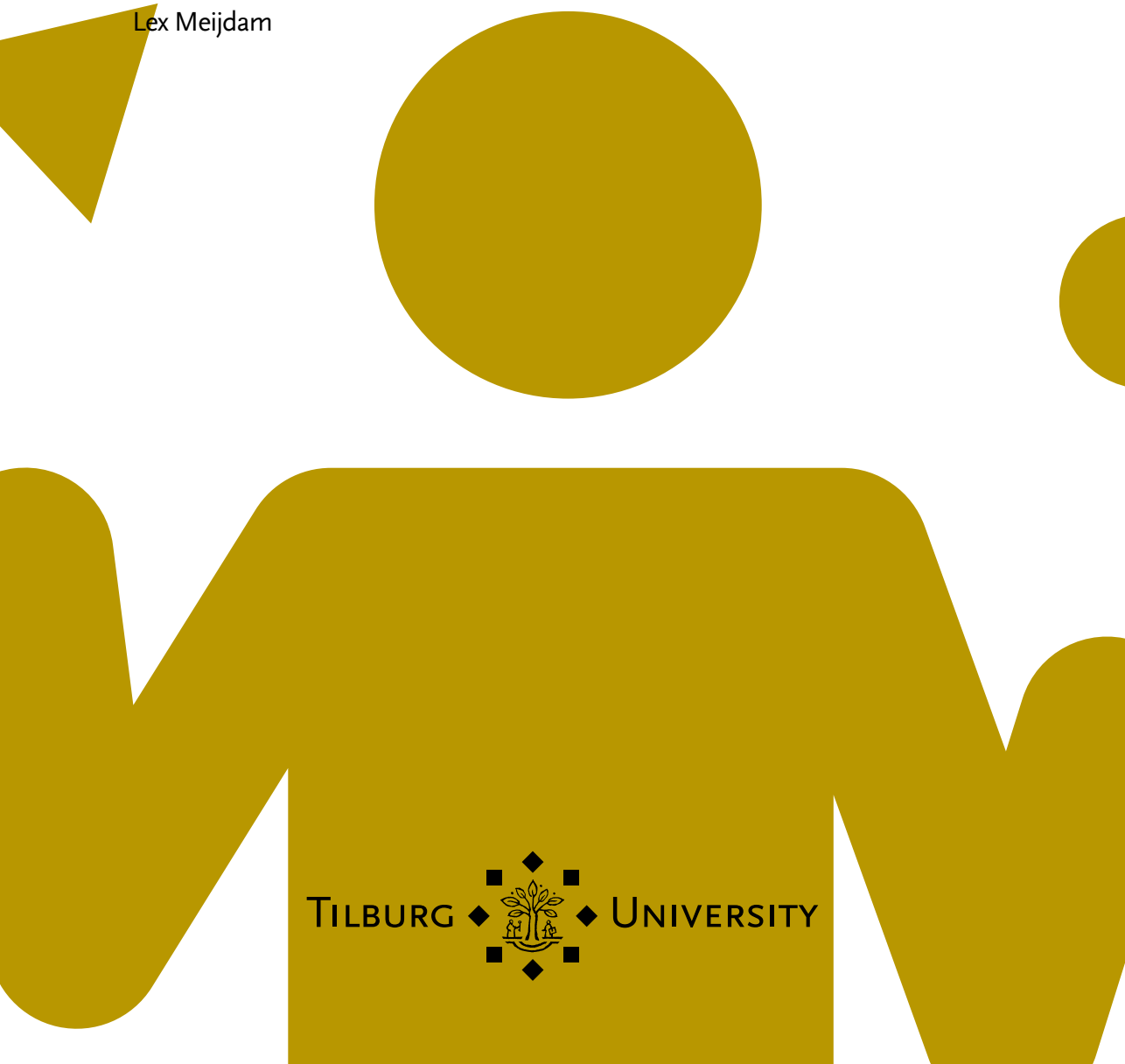
Innovation in higher education: needed and feasible

Philip Joos
Lex Meijdam



TILBURG UNIVERSITY

Innovation in higher education: needed and feasible

Philip Joos
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Tilburg University

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Introduction

Europe's first university was established in Bologna in 1088. Its curriculum was rather narrow, largely devoted to the study of law. Since that time, universities have developed in an attempt to keep pace with our changing society. How have today's knowledge institutes responded to the increasing pace of technological progress? How do they rise to new societal challenges? Why are they pursuing innovation in education – and how are they doing so?

This is the second in a series of essays about education at Tilburg University. It builds upon the first essay, by Alkeline van Lenning and Herman de Regt, which examines the development of a new educational vision at our institution. The implementation of this Tilburg Educational Profile (TEP) is now well in hand. The profile is based on three key elements: *Knowledge, Skills*, and *Character*. The third of these 'ingredients' – character, or attitude – very much typifies Tilburg University's approach. It refers to the development of a moral compass and a mindset that fosters permanent development, or 'lifelong learning'. This is an excellent example of innovation in education, but of course there are many other examples at Tilburg University, notably the Digital Education Enhancement Program (DEEP). But why should a university pursue innovation at all? Is success guaranteed? Can developments in other sectors teach us anything about how innovations can and should be implemented? These are the questions to which we turn our attention in this essay.

First of all, we contend that innovation in education is absolutely essential, today more than ever. Technological developments, especially digitalization, and the transition to a knowledge-based economy are changing the learning landscape at an unprecedented rate. A university that fails to innovate will no longer be able to prepare students to play a valid role in society. Not only are professional profiles changing apace, calling for different knowledge and skills, but students themselves are changing too. They now have different expectations with regard to education. In addition, we see significant developments in educational technology, which are bringing about a veritable revolution in teaching and assessment methods in higher education.

In short, we *must* innovate. But are we able to do so? Innovation in education is not easy, and universities do not have a particularly strong track record in this area. The traditional lecture room has remained virtually unaltered for centuries, while technological innovation has been limited to replacing blackboards and chalk with overhead projectors and PowerPoint presentations. But digitalization is radically changing the learning landscape. The latest

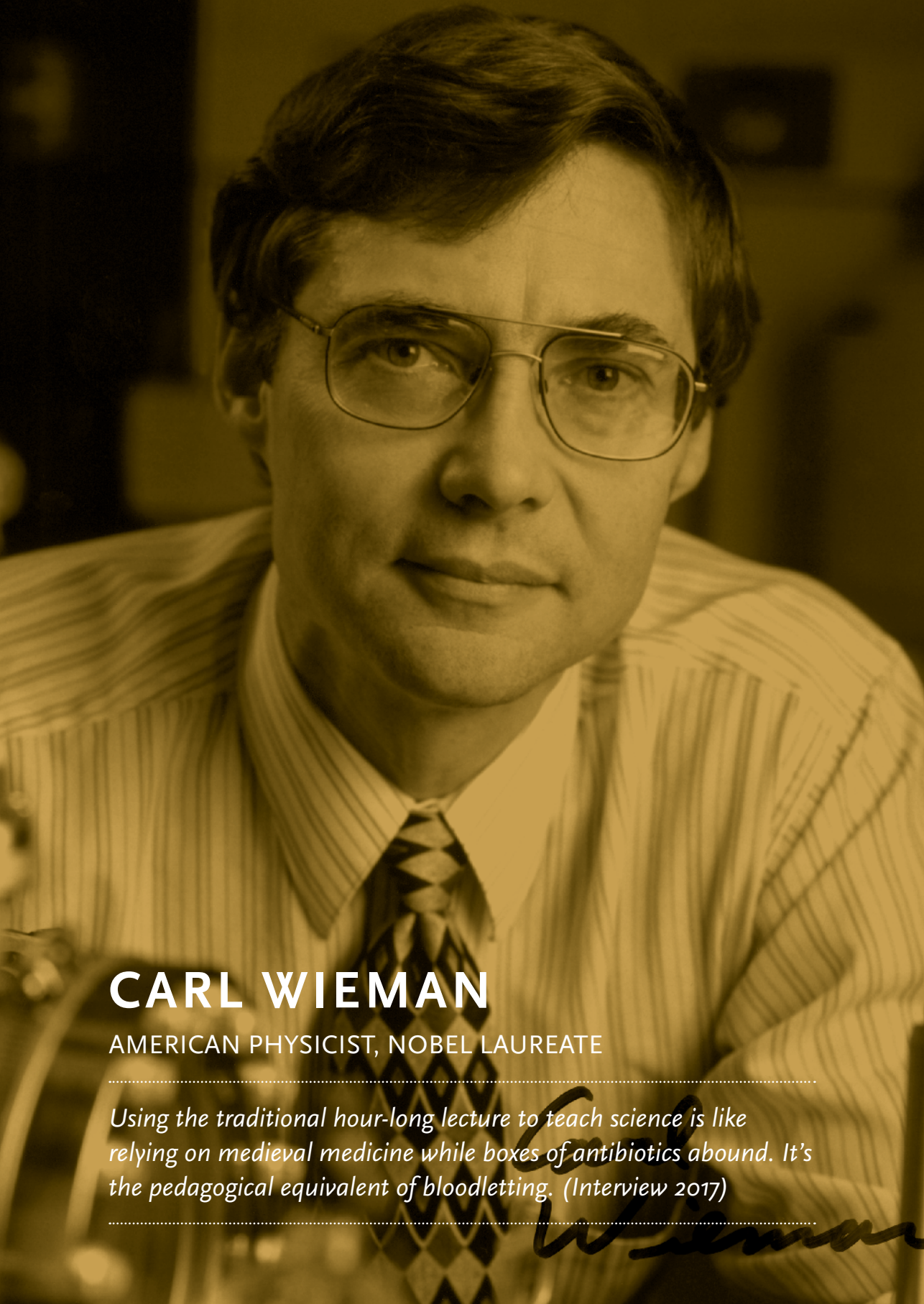
educational technologies offer huge potential to improve teaching and learning methods, and to introduce bespoke, 'student-focused' education that supports a wide range of individual learning styles. There are, however, many challenges. How should universities in general, and Tilburg University in particular, respond?

This is the question we attempt to answer in the second part of this essay. We examine ways in which to create a climate that will nurture and nourish educational innovation. We ask what universities can learn from other types of organizations about adapting within a rapidly changing environment, and how organizational theory can be used to support successful innovation. We have an important caveat here: it will not be possible to apply any lessons directly to universities without keeping in mind the university-specific challenges in terms of the innovation process. These challenges not only explain why educational innovation is often slow to get off the ground, but also help us to understand how a university can achieve greater success in organizing its innovation processes. We illustrate this point with a case study: the introduction of personal mentoring for first-year Bachelor's students as part of the new Tilburg Educational Profile. We devote close attention to the evaluation of the mentoring system using methods drawn from experimental economics. The second part of our essay therefore demonstrates that innovation in education is not only essential, but that it is also feasible, provided one takes the right approach. Will this continue to be the case at Tilburg University?

The third and final part of this essay examines how the lessons drawn from other sectors can help to ensure sustainable innovation. How do we sustain a permanent 'innovation culture'? We describe how Tilburg University has implemented an 'ambidextrous' structure which, besides ensuring the efficiency of existing educational processes, devotes adequate attention to innovation. This has been achieved by setting up the Tilburg Education Innovation Laboratory (EDUiLAB) as part of the DEEP program. Will EDUiLAB live up to expectations? Will it really serve to increase the pace of educational innovation?

PART I

THE NECESSITY OF INNOVATION IN HIGHER EDUCATION



CARL WIEMAN

AMERICAN PHYSICIST, NOBEL LAUREATE

Using the traditional hour-long lecture to teach science is like relying on medieval medicine while boxes of antibiotics abound. It's the pedagogical equivalent of bloodletting. (Interview 2017)

1

A different form of education for a rapidly changing society

It is time for a major overhaul of higher education. The traditional classroom was perfectly adequate in the industrial era, when the knowledge and skills requirement was largely predictable, society was stable, and progress was relatively slow. Today's society, by contrast, is changing very rapidly due to various factors, not least ongoing digitalization.

Our society is changing...

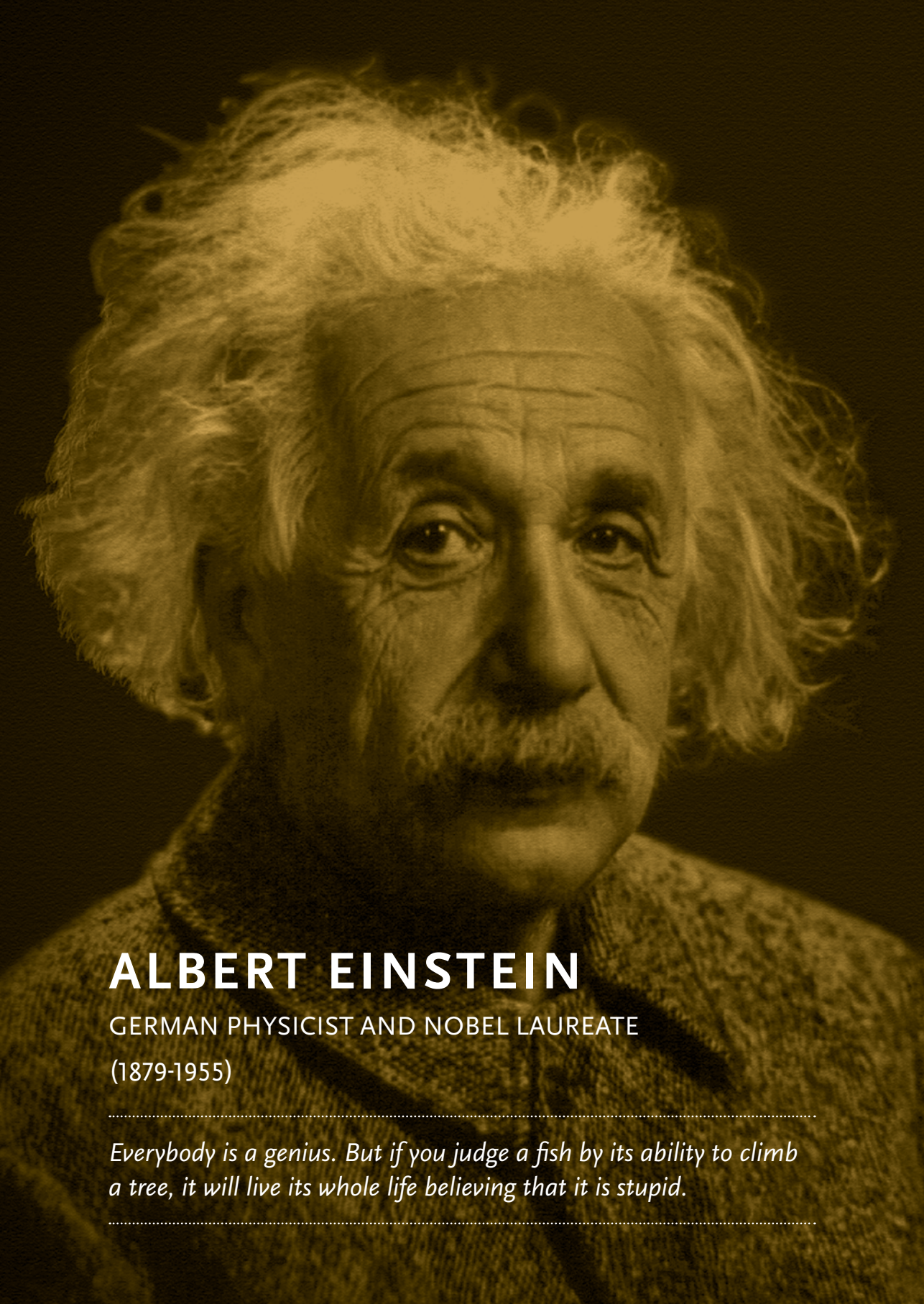
Rather than manufacturing output, our economy now centers around the creation and dissemination of knowledge. The knowledge, skills, and attitude needed to be successful in this new economy are fundamentally different from those of the past. Professional profiles are changing rapidly, and it is possible that many of today's jobs will no longer exist in ten years' time, having been replaced by entirely new professions that are yet to emerge (Frey & Osborne, 2017). While knowledge is now far more accessible, it has not become any easier to assess and apply. Moreover, today's economy calls for more generic qualities, often termed '21st-century skills.'

...as are our students

Digitalization is not only a major driver of societal change, but is also changing our target audience: students and potential students. Unless education adapts to keep pace, it can no longer meet the needs of the very people for whom it is intended. For the current and future generations of students, change and uncertainty are a fact of life. They now live in two 'worlds' simultaneously. There is the real world, where they come to the university campus to study, play sports, and interact with each other, and there is the global digital world which impacts on every aspect of their lives – from shopping and banking to following the news and even dating. An industrial-era one-size-fits-all approach centering on a fixed curriculum cannot meet the modern student's demand for freedom and choice. The greater diversity of the student body (in terms of nationality, cultural background, gender, career expectations, ambitions, etc.) also challenges current educational models. Individualization is the order of the day. There is a famous quote attributed to Albert Einstein:

"Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid."

Don Tapscott, one of North America's most influential trend watchers, describes the new generation of students as people with differing learning expectations. Education, he asserts, should offer more freedom and greater choice. It must be pitched at the right level given the individual student's background. Compared to previous generations, today's students show greater concern for moral values and integrity, which they see as particularly important in this globalized, post-crisis world. Online social networks encourage a new form of 24/7 collaboration. These students were born in the digital era; they expect instant knowledge and readily accessible information, preferably delivered by an open-source system. It is common to use Wikipedia or YouTube to find answers, or perhaps even 'in conversation' with voice recognition devices such as Google Home or Amazon Alexa. Work and entertainment have become intertwined and blended. Modern students are themselves highly innovative and they value the entrepreneurial mindset. They are ever mindful of their future careers. The popularity of courses which combine face-to-face teaching with an online component has shown a significant increase in recent years (Brooks & Pomerantz, 2017).



ALBERT EINSTEIN

GERMAN PHYSICIST AND NOBEL LAUREATE

(1879-1955)

Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid.

Figure 1 shows the consolidated results of an annual survey held among Bachelor's students at 124 universities in ten countries (n = 43,559) in which respondents were asked to state their preferred learning environment. Options ranged from 'no online components' to 'one that is completely online.' Between 2013 and 2017, students show a growing preference for a learning environment that combines online and face-to-face education. Unsurprisingly, student representatives on university and faculty councils in the Netherlands have been fervent advocates of digital innovation in education.

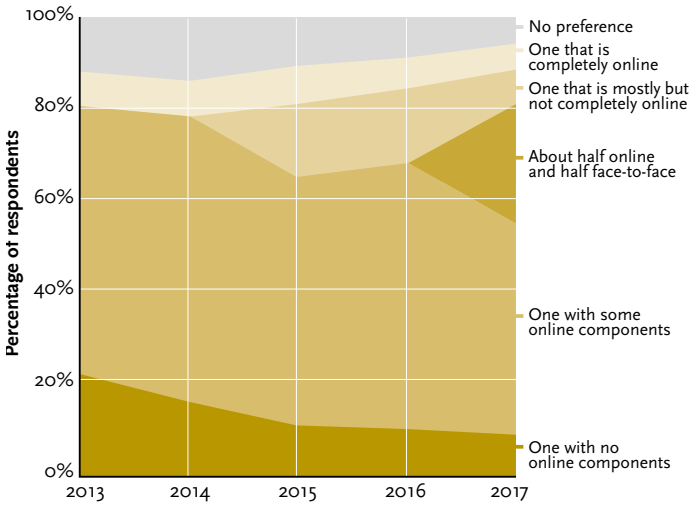


Figure 1: Students' preferred learning environment (Brooks & Pomerantz, 2017)

A new educational model

Innovation in education is essential if universities are to meet the changing needs of students and the expectations of society. Education must support innovation within that society by allowing students to develop the right skills and attitudes, which include critical thinking, creativity, and imagination (OECD, 2016). Students in higher education must evolve to become 'lifelong learners.' The traditional classroom model worked well enough in the industrial era, when mastery of knowledge, conformity, and obedience were regarded as the primary goals of education, but it is simply no longer up to the task. Carl Wieman (2014), who won the Nobel Prize for Physics in 2001, provides strong evidence that the standard lecture, at which students sit in rows, listening, taking notes, and perhaps asking the occasional question, is far less effective than active learning methods that require them to work on tasks that develop their reasoning ability and problem-solving skills. Active learning is a more immersive process. It involves constant feedback from the instructor and fellow students. Creativity, the realization of individual talents, and empowerment are central, whereupon students' potential for intellectual growth is maximized because they must engage higher cognitive strategies such as analysis, synthesis, and evaluation (Slavich & Zimbardo, 2012).

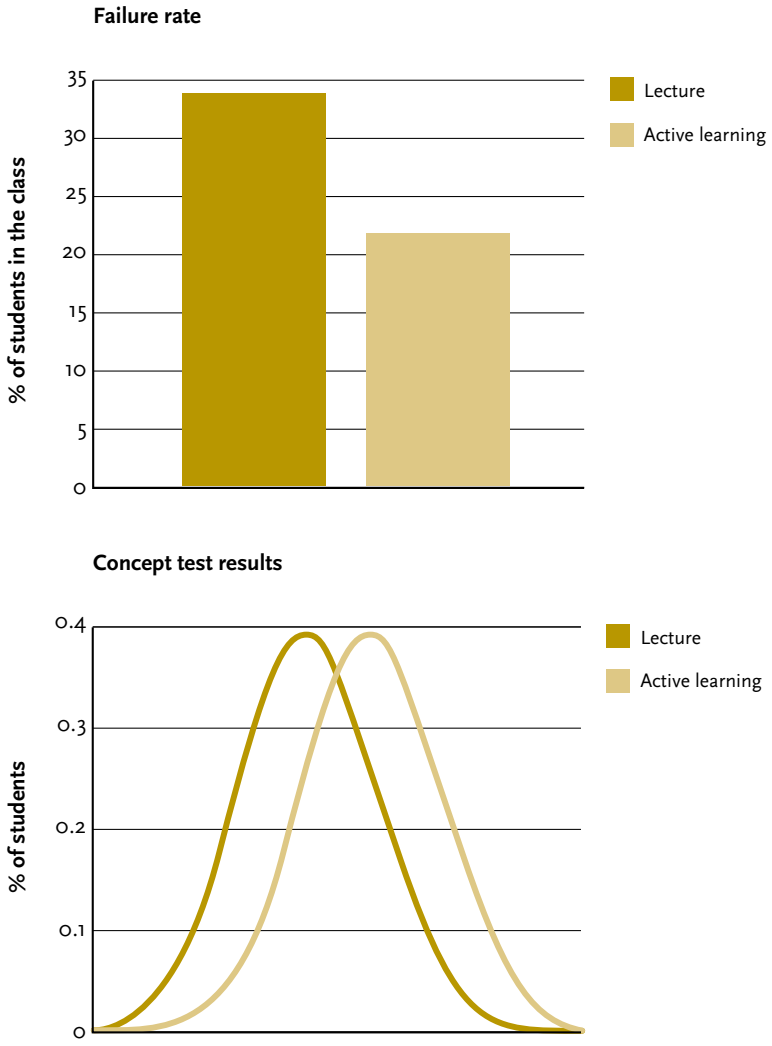


Figure 2: A comparison of the lecture method against active learning in terms of the difference in failure rates for examinations and concept tests (Freeman et al., 2014)

Ultimately, more effective learning by a greater number of students – as reflected by fewer dropouts, faster progression, and better job-matching – is essential from a societal perspective. More effective learning will also help students to develop an attitude that underpins lifelong learning. The 'learning attitude' that forms the basis of the Tilburg Educational Vision is not only linked to the immediate acquisition of knowledge, but also to the further development of relevant skills and character (de Regt & van Lenning, 2017). The absence of an effective model in higher education will inevitably have a high societal cost, in that the new generation of students will not be properly equipped to rise to the economic, social, and environmental challenges that await.

A different scale and a different role for instructors

The educational innovations that society demands are not minor 'tweaks' but radical changes. Not only must the form of education be overhauled, but the new learning proposition brings a different role for the instructor. Richard Miller, president of the Olin College of Engineering and winner of the 2017 Brock International Prize in Education, offers an insightful account of the role of education: "You send your kids to school, they learn lots of stuff, and their life will be better. In fact, that is a testable hypothesis. But a three times better predictor of positive life outcomes than either knowledge or intelligence is 'grit' – the combination of passion and perseverance. It is about attitudes, behaviors, and motivations. The value proposition of just knowing stuff has changed, probably permanently. It is not about what you know, but about what you can do with what you know. The teacher is not the expert, but should be the coach – coaches are very important in sports – so the best is not to organize large-scale classes in auditoria, but rather to have small groups talking to each other."

Miller contends that the role of a university instructor as solely an 'imparter of knowledge' has become all but obsolete in the face of changing societal requirements. Today, most knowledge is readily accessible and freely available online. Many technology companies have become involved in knowledge transfer and other aspects of learning. By drawing upon the various resources now available, universities can restructure their educational processes to become more efficient. However, this does call for investments to be made. Universities are generally reluctant to increase their tuition fees (and publicly funded institutions are unable to do so) and must therefore devote a larger proportion of their budget to improving the technological infrastructure. This inevitably reduces the amount available for staff appointments or for supporting the new roles created by the use of innovative technology.

It is clear that higher education must change. This of course raises the question of how to ensure that innovations are developed and implemented. Before attempting to answer that question, we first offer a more detailed definition of 'innovation in education.' What types of innovation can we distinguish, and what can we say about the innovators?

2

What is innovation in education?

Tech entrepreneur Danny Crichton in a 2015 blog discussing the next wave of innovation in education: "Few areas have been as hopeful and as disappointing as innovation in education. Education is probably the single most important function in our society today, yet it remains one of the least understood, despite incredible levels of investment from venture capitalists and governments. [...] With the rise of the internet, it seemed like education was on the cusp of a complete revolution. Today, though, you would be excused for not seeing much of a difference between the way we learn and how we did so twenty years ago."

Innovation means a new approach with better results...

In 1963, Harvard Business School professor Theodore Levitt stated that creativity is not enough to ensure progress. Creativity is thinking up new things, but innovation is about *doing* new things. Innovation in education is a process of creating and disseminating new teaching practices, organizational structures, and technology. Innovation is not merely a synonym for 'different' or 'creative.' Innovation in education represents a new approach which will give better results, whether in terms of a better learning experience or a more efficient teaching and learning method. The word 'new' lends itself to various interpretations. An innovation can be new to the organization, new to the market, new to the sector, or new to society (Edison et al., 2014) but there are always two key elements: innovation is implemented within a real-life setting, and it is accompanied by some form of evaluation in order to confirm that innovation has brought about some form of improvement.

...technology-driven or not...

Innovation in education is therefore a new approach to teaching and learning that produces better results. It can take many forms. In this section, we offer a brief overview of educational innovations, which we group under two headings: non-technology-driven and technology-driven.

1. Non-technology-driven innovation

Although digital technology plays an important role in innovation, the past two decades have seen many innovations in higher education that have little or no reliance on technology. They are non-digital (analogue) or non-technology-driven. When considering this type of innovation, we can distinguish between innovation in pedagogy (teaching and learning methodology) and innovation in educational products. Let's begin by examining three examples of non-technology-driven innovation in pedagogy.

Baun (2015) discusses the effects of 'accelerated, intensive, and immersive learning' as new educational delivery methods. In an accelerated learning program, students devote more time each day to the subject matter. Immersive learning means full-time exposure to the discipline, twenty four hours a day and seven days a week. Hybrid forms of these methods are often referred to as 'concentrated learning,' having shorter timeframes than the traditional university quarter or semester. Baun demonstrates that active learning methods contribute greatly to the success of concentrated learning.

A second example is 'inquiry-based learning' (IBL). An increasing number of universities have adopted IBL as a way of cultivating their students' ability to formulate the right questions, conduct independent research, assess risks, and to develop as self-directed individuals (Blessinger & Carfora, 2014). In all such forms of active learning, the role of instructor shifts from the mere 'presenter' of course materials to that of a 'learning architect' or Miller's 'coach.' While there are some potential pitfalls, extensive experimental research has shown that IBL produces significantly better learning results than traditional methods such as the standard lecture. One interesting component of IBL might be the 'flipped classroom,' whereby students prepare by studying the course materials (reading, watching videos, completing online modules, etc.) before they go to class, arming themselves with questions and problems to discuss with the instructor and each other.

Our third example is that of 'authentic learning experiences,' which involves students being immersed in environments that will instill lifelong learning skills. Students face real-life problems in actual work situations. The most familiar form of authentic learning is the traditional internship. Another example is part of Tilburg University's Master's course in Strategic Management. Having gained some key consulting skills in class, students are invited to provide actual strategic advice to a real-life startup as part of a business accelerator program run at the High-Tech Campus in Eindhoven. Throughout the process, students are coached by faculty members as they learn what consultancy practice actually entails, which may not be in keeping with their expectations. The advice they offer can help startup entrepreneurs to improve their business models and prepare an effective pitch as they go in search of venture capital.

Another class of non-technology-driven innovations are the *new educational products*. In its 2018 report about the future of higher education, the influential New Media Consortium (NMC) reports an increase in the popularity of interdisciplinary programs. Tilburg University offers several such programs, including the BSc in Entrepreneurship & Business Innovation, the BSc in Global Management of Social Issues, the BSc in Public Governance, the University College program and the MSc in Data Science and Society.The latter is a prime example of how data science intersects with social science disciplines such as law, business, and governance.

Another relatively recent innovation is the flexible modular degree course, whereby the program is divided into various sections, each with its own certificate or diploma. Udacity and edX are among the platforms that award 'microcredentials' (sometimes termed 'nanodegrees' or 'micro-Master's') upon completion of a short learning module. This system is gaining popularity in part-time programs aimed at professionals who wish to increase or update their knowledge.

2. Technology-driven innovation

Today, of course, many educational innovations do indeed rely on technology, which may be used to increase productivity and operational efficiency, although much attention is also devoted to the quality of education. Christensen (1997) introduces the concepts of 'sustaining' (or 'incremental') and 'disruptive' technologies. Sustaining technologies are intended to improve the performance of existing systems. Disruptive technologies seek to address new requirements within new markets. The replacement of the overhead projector by the computer-based PowerPoint presentation is an example of a sustaining technology (Law et al., 2011). Online learning platforms are a form of disruptive technology, in that they radically alter the what, where, when and how of learning by allowing students to collaborate and learn from their peers at the same institution, or perhaps one on the other side of the world. This type of technology represents a fundamental change to the nature of the classroom and its traditional working relationships, as well as the roles and expectations of instructors.

SURF is the collaborative ICT organization for Dutch education and research. Its 2016 Trend Report offers a useful overview of 13 technological trends that are likely to impact the future of education (see Figure 3). A distinction is drawn between technologies that supplement and enrich education (such as virtual reality and serious gaming), those that facilitate greater flexibility in education (the virtual classroom and personalized learning environments), and those that support adaptive learning (digital assessment and learning analytics).

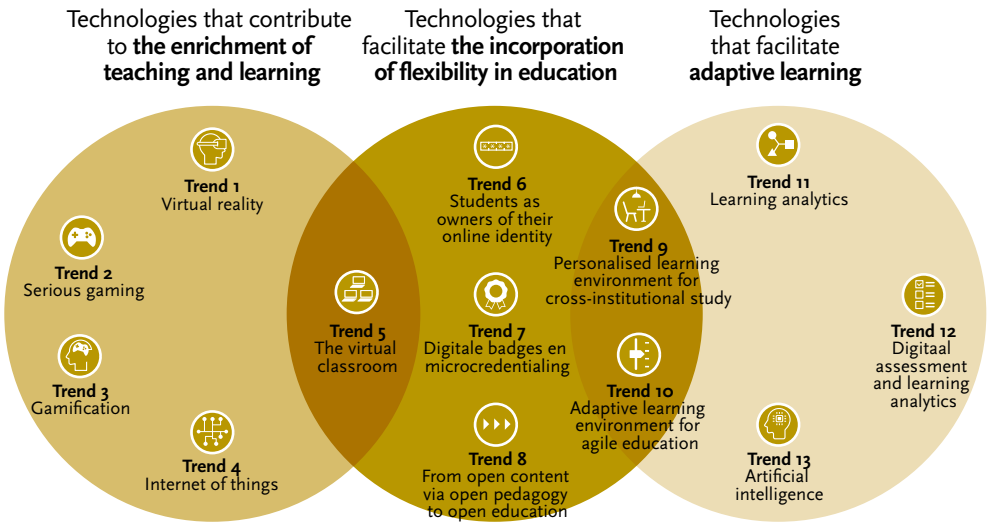


Figure 3: Thirteen technological trends in three overlapping domains: (1) Enrichment of teaching and learning, (2) Incorporation of flexibility in education, and (3) Adaptive learning (SURF, 2016)

The DAF Augmented Reality LAB at Tilburg University is a good example of how a new technology can enrich the student's learning experience while also generating data about the learning process by measuring behavior and physiological responses. The DAF Lab opened in October 2015 and offers groups of 10 to 15 students a 'mixed reality' experience in a 5-by-5-meter room dubbed 'The Cave.' It is equipped with eight 'short throw' projectors, which provide an interactive 360-degree display on all four walls. Highly accurate sensors can measure heart rate, skin conductance, respiration, and facial muscle activity, as well as track eye movements. The DAF LAB allows immersive education to be combined with interdisciplinary research. Law students, for example, can find themselves conducting a complex case in a virtual but extremely authentic courtroom setting. During a simulation exercise, research data is collected to offer both the students and the instructor real-time feedback. Besides replacing lectures with more interactive simulation sessions, the DAF LAB also allows students to conduct collaborative assignments, to acquire or practice new skills, or to perform independent research as part of their graduation project.

Photo: DAF Augmented Reality Lab at Tilburg University

Education Technology ('edtech') companies are exploiting the rapidly growing impact of technology in education. Their products range from relatively simple video applications to advanced augmented reality systems and MOOCS (massive open online courses) with microcredentials. Annual growth in the edtech sector is estimated to be in the region of 17%, with projected revenue of 250 billion euros by 2020. Many universities are now abandoning the use of applications developed by their own in-house IT teams in favor of partnerships with edtech startups. In 2017, for example, Singapore Management University replaced its education support system with an online alternative offered by the London-based company SmartUp. The reason is simple: SmartUp offers far better quality (Financial Times, 2017). Partnerships between universities and edtech companies, often on a different continent, will become increasingly common in the face of high capital investment costs and rapid technological advances that can render a state-of-the-art system obsolete within months.

... by innovators

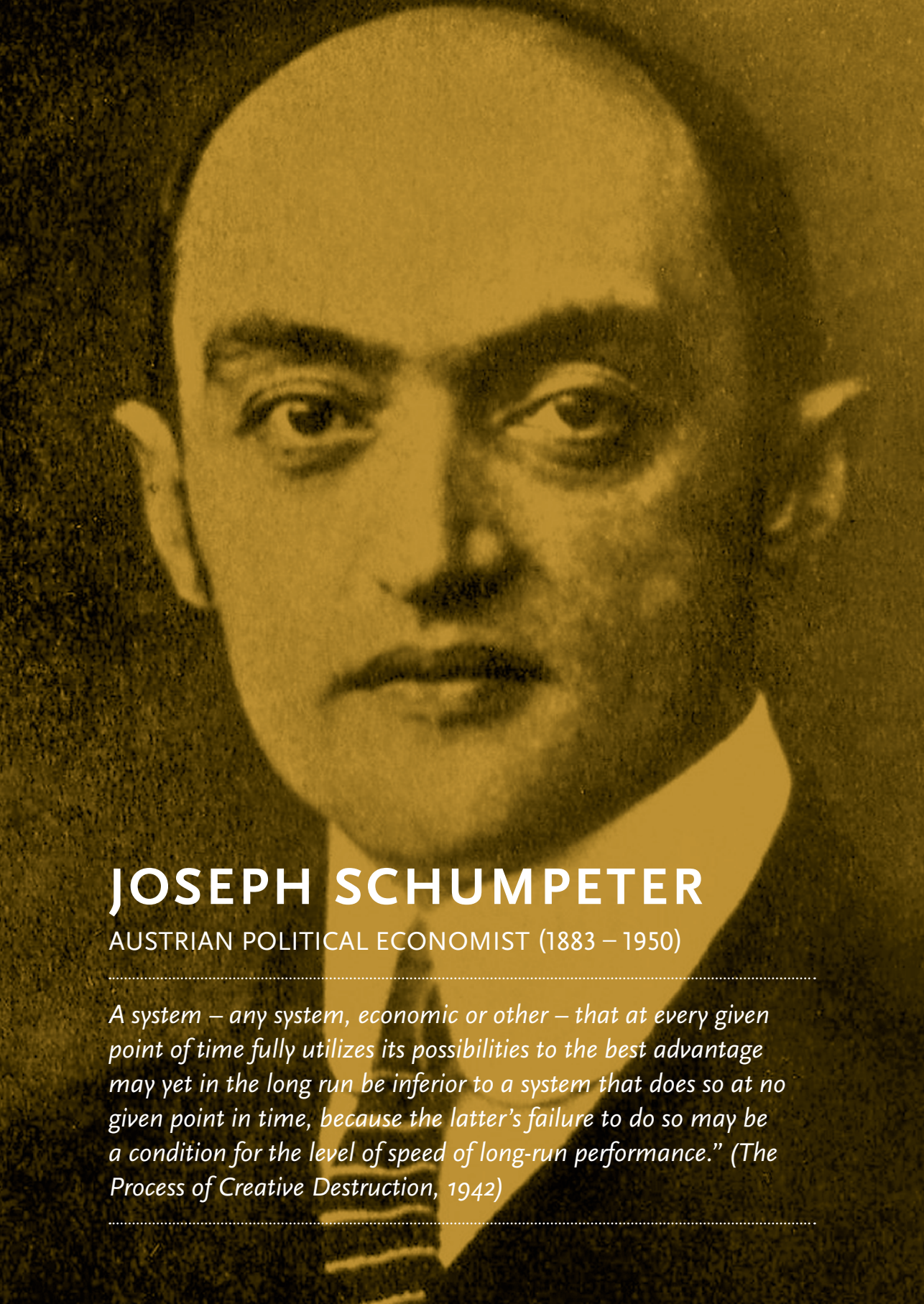
Of course, there can be no innovation without innovators. These are the people who rise to the challenge of deciding whether a change is an improvement. What can we say about innovators? Based on extensive research, Silver-Pacuilla et al. (2011) identify four characteristics which set apart educational innovators.

First, innovators ask the right questions based on what is now possible. For example: how could augmented reality enrich teaching and learning in medical psychology? Second, innovators acknowledge that we live in a rapidly changing world in which the past is not a good predictor of the future. They therefore monitor and track trends. Third, innovators take enough time to ensure that their innovations will become fully embedded in the educational culture. They must be allowed to test their ideas and make mistakes without fear of repercussions (trial and error). Lastly, innovators are able to identify new markets, opportunities, and applications. They show the creativity needed to implement, say, online gaming within a particularly knowledge domain.

In this first part of our essay, we have argued that universities *must* innovate: there is no alternative. We have examined what innovation in education entails, and we have briefly described the innovators. In the second part, we discuss how universities should rise to the challenge of innovation, creating a climate that fosters innovation and encourages all instructors to become educational innovators.

PART II

HOW TO ACHIEVE INNOVATION IN HIGHER EDUCATION



JOSEPH SCHUMPETER

AUSTRIAN POLITICAL ECONOMIST (1883 – 1950)

A system – any system, economic or other – that at every given point of time fully utilizes its possibilities to the best advantage may yet in the long run be inferior to a system that does so at no given point in time, because the latter's failure to do so may be a condition for the level of speed of long-run performance." (The Process of Creative Destruction, 1942)

3

Introduction

How do organizations survive in a changing world? How should universities respond to the changes in the society they serve? These fundamental questions occupy the time and talents of specialists in many disciplines, including management science, history, strategy, organizational psychology, and economics. Innovation is seen as the key to an organization's survival, continuity, and long-term growth (Schumpeter,1934). Nevertheless, the process of organizing innovation appears to be a major challenge in itself. In this part of our essay, we first examine the theory of adaptive organizations and the organization of change. We then consider the specific challenges facing universities wishing to achieve educational innovation. We conclude by examining how innovation in higher education can be encouraged, presenting a case study that describes a specific innovation at Tilburg University.

4

The adaptive organization: theoretical insights

"It is not the strongest of the species that survives, nor the most intelligent, but the one that is most responsive to change." – Charles Darwin

Successful adaptation calls for ambidexterity...

To ensure long-term success, an organization must be able to respond effectively to the changes in its wider setting. It must formulate 'adaptive responses.' In his seminal work, James March (1991) asserts that organizations must be 'ambidextrous': they must be able to explore new possibilities while simultaneously exploiting existing certainties. Here, exploitation refers to activities such as improvement processes, efficiency, production, operationalization, selection, and implementation. Organizations closely monitor the costs and results of these activities and implement formal control structures. By contrast, exploration is best encapsulated by terms such as seeking, varying, experimenting, and discovering. Enterprise and 'thinking outside the box' are encouraged, while the focus is on control structures that are based on the markers of growth. In keeping with the notion of 'creative destruction' posited by Schumpeter in the mid-1930s, James March and other scholars have drawn attention to the internal tensions organizations are likely to encounter when attempting to set up a structure that accommodates both exploitation and exploration. This is because the two activities compete for scarce resources. Exploration automatically implies conflict and a redefinition of existing processes and procedures, while exploitation thrives on consensus and stability. The returns from exploration are systematically less certain and are more remote in time compared to those returns from exploitation. Adaptive processes generally achieve positive results more quickly when based on exploitation rather than exploration.

Google's restructuring to create the parent company Alphabet Inc. in 2015 was its way of achieving ambidexterity (*The Economist*, 2015). To mollify nervous shareholders, the company split its mature core business activities such as Google Search and YouTube from the more risk-laden components such as GoogleX and Google Capital. Doing so enabled Google to undertake and report on innovative projects (such as its driverless vehicles) in a more transparent manner, thus protecting its core business and brand reputation.

...good leadership, long cycles, and flexible budgets...

Since the publication of March (1991), further research has examined the 'when' and 'how' of organizational adaptation. Van Looy et al. (2005) show that several factors help to determine the success of ambidextrous organizations. One such factor is the use of longer cycles to allow time for the combined effects of existing and new activities to become apparent. Ambidextrous organizations are able to offset any decline in existing activities by encouraging growth in their new activities. Another factor is the degree of flexibility with which resources can be divided between existing and new activities. Van Looy et al. demonstrate that effective resource sharing for both activities is likely to encourage the development and application of new products, thus increasing the overall value of the organization.

O'Reilly and Tushman (2008) provide another important insight regarding the role of senior teams in building dynamic capabilities within ambidextrous organizations. Senior management must have the necessary knowledge and skills to establish and nurture both exploitation and exploration. They must follow a professional decision-making procedure to ensure that resources are available to both, and they must apply routines such as a regular strategy cycle and regular communication with external stakeholders. They must also provide resources for competitive intelligence and technology tracking, and forums that allow the discussion of new opportunities throughout the organization.

... that can be organized effectively

John P. Kotter is an iconic figure in the field of organizational change and transformation. In his influential book *Leading Change*, he presents an eight-step model for change management (Kotter, 1996).

Figure 4: Eight steps in organizational change and transformation (Kotter, 1996)

The first three steps of *Figure 4* involve creating a fertile climate for change. The very first step is to instill a sense of urgency by emphasizing the potential threats and identifying the opportunities that effective interventions will create. In this phase, management must involve the key stakeholders and initiate an open dialogue (to encourage them to think about the dominant issues) while presenting convincing arguments for change. The second step is that of forming a powerful coalition, which entails identifying effective change leaders within the organization and securing their commitment. Next, a vision and strategy for change will be developed. This involves determining the organization's key values and defining the target situation: the 'horizon' to be reached at the end of the change process. It is essential that the change leaders are able to present the vision in a way that can be readily understood by all. This will greatly facilitate the next phase, 'engaging and enabling the organization,' which begins by communicating the vision in a powerful and persuasive way. Any concerns that people may have must be addressed fairly and honestly.

It is now time to empower action and ensure that an organizational structure and processes that are in line with the overall vision are in place. At the same time, potential obstacles to the change process are removed and a reward structure put in place to acknowledge people's input, cooperation, and support. The achievement of 'quick wins' at this early stage can create a sense of victory and provide added impetus. Rather than having a single long-term objective, it is preferable to define a number of short-term targets. They will be easier and less expensive to attain, and will have a greater chance of success. The people who contribute to the attainment of the targets should be rewarded accordingly. The third and final phase is that of sustaining the changes and consolidating the benefits. The organization must now strive for ongoing improvement while working to ensure that the changes are fully imbedded in the organizational culture.

An example of how Kotter's model has been successfully applied in an educational setting is given at the end of this section.

5

Specific challenges for universities

Generating and implementing innovations is a challenging undertaking for any type of organization. In this section, we discuss a number of challenges specific to universities that make innovation in education more difficult than innovation in other sectors.

Innovators are preaching to the choir...

Let's begin with the individual instructor and the way in which she proposes educational innovations. This innovator is most likely to communicate her ideas through workshops, newsletters, and presentations. In other words, innovators are talking to their colleagues, and predominantly those who are open to the idea of innovation. Unfortunately, the message is unlikely to reach those who are not. In other words, innovators are largely preaching to the choir (Elton, 2003). Although this phenomenon can be seen in various types of organization, it seems particularly prevalent among universities. Why is this?

...but also encounter opposition

All too often, we see academics resisting their own professional development, certainly in terms of teaching practice, while permanent development in other professions is the norm. During a strategy meeting held at Tilburg University in 2017, academic staff were asked whether they agreed that there should be more innovation in education. Almost a third (29%) answered 'no.' Some said that they wanted to use 'more chalk on the blackboard' to make their lectures more appealing. A significant number suggested that non-technological innovations, such as smaller discussion groups and case-based learning, would make their courses more relevant and more attractive. When asked how they would spend 100,000 euros on innovation in education, most suggested increasing investment in support such as IT facilities and teaching assistants. Relatively few seemed to be aware of the more advanced technological trends, and there was little backing for the implementation of more radical forms of innovation. What lies at the root of this indifference?

The nature of academic work

The foregoing can be seen as an illustration of a deeper problem which has its roots in the nature of the academic profession. Career paths in this field are based on both education and research: two extremely different activities which often play entirely different roles. It is generally assumed that academics attach greater importance to their research, with teaching very much in second place. Given the choice, they would opt to devote a greater proportion of their time to research. This may well explain their eagerness to devote any additional budget to support such as assistants and readers, since this would free up more time for research.

Stanford University Creative Commons

The Stanford University Creative Commons is a digital platform that allows faculty staff to discover, create, share, and collaborate in innovation. There are descriptions of recent innovations (the flipped classroom, critical thinking, learning analytics, negotiation games, etc.), as well as guidelines for designing an effective syllabus. There is also an interesting example of how students themselves can contribute to innovation. In 2014, a group of students from the Stanford First-Generation and/or Low-income Partnership (FLIP) devised a program called 'What I Wish My Professor Knew' to help instructors understand how their teaching practice and statements can make the difference between these students feeling alienated or welcomed at the university.
Stanford eCorner is a free online archive of podcasts, videos, and articles on entrepreneurship that can be integrated with the course material.
The Stanford Teaching Commons website includes a series of online lectures by prominent Stanford staff who share their insights about the profession. There is also a searchable library.

https://teachingcommons.stanford.edu/events-opportunities/award-winning-teachers-teaching

Award-winning teachers on teaching

ENGAGING STUDENTS, MENTORING STUDENTS

What do Teaching, Advising, Mentoring and Lecturing Have in Common? Almost Everything!

John Boothroyd

PROFESSOR MICROBIOLOGY AND IMMONOLOGY
MAY 14, 2013

Video | Itunes U

COURSE DESIGN, CRITICAL THINKING, ENGAGING STUDENTS, STEM TEACHING, STUDENT LEARNING

Guiding Students as They Learn How to Think

Ravi Vakil

FEBRUARY 21, 2013

Video

DIVERSITY ISSUES, LEARNING MATTERS, MENTORING STUDENTS, SOTL, STUDENT LEARNING

Stereotype Threat: How It Affects Us and What We Can Do About It

Claude Steele

JANUARY 30, 2013

Video | Itunes U

INTRODUCTORY COURSES, LARGE COURSES, LECTURING, STUDENT LEARNING

Large Classes: Keeping the Energy in 220 Relationships at Once

Timothy Bresnahan

NOVEMBER 24, 2013

Video | Itunes U

In fact, there are studies that conclude that most academics are indeed interested in the combination of or research and teaching, although many have a slight preference for the former. Most assert that their research activities strengthen their teaching practice (Teichler, 2017). A culture in which research is seen as 'superior' to education can also be partly explained by the relative ease with which research impact can be measured compared to learning impact or the results of any innovation effort. When appointing or promoting academic staff, research output is more likely to be used as a measure of quality than success in the lecture room.

Technological development will do nothing to resolve the tension between research and education. Quite the reverse. Innovation such as online education, alternative assessment methods, and new learning-management systems are changing our profession. They demand a significant time investment as the faculty learns to use the new technology to improve the teaching and learning experience. Additional IT support can of course lighten the load, but support staff often have only a limited understanding of how their academic counterparts spend their time or what their motivations are. This makes it difficult to provide the right kind of support.

Musselin (2006) points to two other specific aspects of academic work that hamper innovation. First, there is limited cooperation and coordination in both education and research. Academics can be somewhat individualistic, knowing little about what their colleagues are teaching as part of the curriculum in which they are involved. Technology can help in this respect, as illustrated by the Stanford University Creative Commons (see inset).

Academics also have a tendency to be insular, operating within their own little 'bubble.' Interaction with faculties, schools, or departments that are concerned with other disciplines is sporadic and transient. The fact that research performance is usually judged in terms of publication output does not help. There are of course alternatives, such as interdisciplinary programs or institutions. 'Mixed' programs such as the Bachelor's degree in liberal arts and sciences have long played an important role in the United States and are now becoming increasingly popular among European students. There are several successful interdisciplinary programs at both Bachelor's and Master's level, as well as broad-based programs such as data science. The downside is perhaps that academics working within an interdisciplinary institution often have insufficient contact with peers in their own discipline.

"Many of the world's great scientists have been teaching with scant evidence to support their methods, something they would never tolerate in their research."
Interview with Nobel Laureate Carl Wieman, April 2017

Musselin also draws attention to the fact that teaching and learning processes are rarely studied at universities, let alone used to improve pedagogy. Instructors are often reluctant to open their lectures to researchers, or even colleagues for the purposes of peer review. Research activities are far more open to scrutiny by fellow researchers, since peer review is the essence of the publication system and research seminars. The actual effects of teaching on students, in terms of both content and presentation, remains unclear since there are still no adequate learning indicators. To measure learning with any degree of accuracy calls for control groups and a good understanding of the learning outcomes, as we shall illustrate with a case study examining the introduction of mentoring for first-year students at Tilburg University. Much weight is given to teaching evaluations, but they are in fact poor indicators of what students actually learn. A 2018 report by the New Media Consortium on the future of higher education devotes considerable attention to the measurement of learning. It notes growing interest in assessment and describes some of the numerous methods and tools that are now used to evaluate and document academic development, progress, skills acquisition, and students' other educational requirements (NMC, 2018). Here, too, technology is creating new possibilities. Digital resources in combination with learning analytics help to quantify learning and give us a better understanding of the learning effect of various educational activities. The use of methods that have recently been developed in the field of experimental economics can also be applied to determine what does and does not work in education, as illustrated by the case study at the end of this section.

6

How can innovation in higher education be stimulated?

Successful innovation demands some system of incentives. Elton (2003) describes a 'power strategy' required to influence people that is based on *incentives* and *obligations* – or 'carrots and sticks.' Either can come from within or outside the university. Here we present four possible incentive scenarios for higher education.

Scenario 1: external incentives

External incentives are generally financial in nature, with some funding agency sponsoring innovation. In the Dutch situation, for example, the Netherlands Initiative for Education Research (NRO) runs the Comenius program under which grants and fellowships are awarded to instructors wishing to pursue innovation in higher education, allowing them to implement their ideals and ideas in practice. In 2018, a total of 70 grants (at three levels) were awarded, representing an injection of almost six million euros to support promising innovation proposals. The projects concerned include 'the International Classroom,' 'Smarter and Better Learning with ICT,' and various student-welfare initiatives.

Scenario 2: external obligations

This scenario has a prominent role for accreditation bodies, both national and international, and the government. In the Netherlands, universities and their programs are accredited by the Dutch-Flemish Accreditation Organization (NVAO), which also establishes the standards for quality assurance. Failure to meet those standards will result in the withdrawal of government funding for the program(s) concerned. At the international level, the most important accreditation body for business schools is the Association to Advance Collegiate Schools in Business (AACSB). This organization's accreditation standards devote specific attention to engagement, impact, and innovation. In 2010, the AACSB produced a report on the importance of innovation in business schools, and this is reflected by the current standards. The AACSB has also expanded its definition of 'the intellectual contribution made

by academic staff' to include pedagogical scholarship. In other words, the faculty staff's contribution to the dissemination of educational innovations is seen to form an integral part of the institution's intellectual capital.

Scenario 3: internal incentives

Internal innovation funds and the academic promotion policy play an important part in this scenario. Senior management can decide to make budgets and time available for innovation, as well as the physical resources required such as IT and studio recording equipment. Alongside financial incentives, there should be explicit recognition for innovation activities when considering appointments and promotions, thus providing another clear incentive. Indeed, the lack of such recognition could create a strong disincentive – a reason *not* to pursue innovation. Relying solely on student evaluations to measure the effect of education and innovation is too narrow and too subjective an approach. Management gurus Tom Peters and Robert Waterman note in their book *In Search of Excellence* (1982) that successful companies use metrics to ensure that people are spending their time on the things that really matter. Such measurement should be used as a guide to help managers take the most important decisions regarding the allocation of resources that will ultimately determine the company's innovation strategy. Learning analytics can be used to arrive at a better, more objective measurement of learning and the impact of educational innovations. This information can ensure that promotion decisions give more weight to the educational dimension.

Scenario 4: internal obligations

Internal obligations refer to the top-down decisions of the executive board or deans that establish minimum standards for the quality of education and for innovation. They may, for example, require attendance at teaching practice workshops, a minimum online component in programs, or mandatory adoption of a new learning-management system or digital assessment tool. Failure to meet any such requirement could result in a financial penalty for the department or program, or a negative annual appraisal and even disciplinary measures for the individual. To ensure that such 'sticks' actually work, the rules and the underlying reasons for those rules must be clearly communicated and understood by everyone within the organization. Effective academic leadership is represented in deans and provosts who are visionary, fair, exemplary, and trustworthy.

Successful changes at universities will be the result of a combination of top-down and bottom-up pressure, whereby the top-down is primarily facilitative and the bottom-up is innovative in nature (Berg & Östergren, 1979). To nurture a culture of educational innovation, it is not only the experiment itself that must gain acceptance. It is also essential to allow for setbacks and failures, since they too are part of the learning process. It is important to encourage an entrepreneurial mindset among both staff and students. Every good idea begins with a spark of inspiration. Students and staff should be given the resources needed to make progress: to fan that spark into a burning flame (NMC, 2018). Financial resources

play only a limited role. Funding can facilitate innovation but is never the decisive factor. As the late Steve Jobs told us: “Innovation has nothing to do with how many R&D dollars you have. When Apple came up with the Mac, IBM was spending at least a hundred times more on R&D. It’s not about money. It’s about the people you have, how you’re led, and how much you get it.”

7

Case study: implementing a mentoring system and measuring its impact

Thus far, we have identified two factors that are essential if innovation in higher education is to be successful. First, instructors themselves must have adequate incentives to improve education, to develop an entrepreneurial mindset, and to invest time and energy in experimentation. Second, effective means of evaluating learning must be developed, together with state-of-the-art methods that can be used to devise, implement, and evaluate educational experiments. Once all factors are in place, it is possible to use Kotter's model to organize change within the higher-education setting. We now present a case study that illustrates the use of Kotter's change-management model and offers a good example of the careful implementation and evaluation of an experiment.

Mentoring in the BSc International Business Administration program

In the first essay in this series, de Regt and van Lenning (2017) present an educational vision for Tilburg University that centers around Knowledge, Skills and Character. Mentoring is extremely appropriate to this vision and is one of the ten points of the Tilburg Education Profile with which it is being implemented. To introduce mentoring at Bachelor's level, it was decided to run a pilot project in one of the six programs offered by Tilburg School of Economics and Management (TISEM). The choice fell to the International Business Administration (IBA) program, which has a large, international, and particularly diverse student body (see inset).

Mentoring within the Bachelor's program in International Business Administration

This pilot project began in September 2017 and involved producing a Personal-Development Plan (PDP) for each first-year student. The PDP is a tool that helps the students to reflect on their learning practice, progress, and achievements. It supports the development of self-directed learning skills that can be applied in planning future learning activities and a career path in keeping with the individual's talents, interests, knowledge, skills, and attitude. Students play an active role based on their intrinsic motivation to think about personal development and their future. They receive help and guidance from the mentors and trainers of the Educational Support Team and the Student Career Center. The students on the PDP program are expected to take part in the following activities:

- A short information session as part of the introduction week for all students.
- A kick-off session organized by the mentors.
- Two training sessions: one on study skills and the other on self-reflection. The purpose is to help students write their personal-development evaluation and to reflect on the progress they have made.
- Two assessment sessions (one in November 2017 and the other in February 2018) at which the students engage in self-evaluation and formulate their personal-development goals by means of a written Personal-Development Plan.
- Feedback sessions at which the mentors provide personal feedback and guidance.

The PDP program invites students to set their own long-term goals and, with the help of their mentor, define what they must do in order to achieve those goals. The student is first expected to think carefully about their current situation and their values, beliefs, and aims. Next, they will define their shorter-term objectives and ambitions in terms of the IBA program.

Support for the PDP program is provided by a total of 38 mentors: six academic mentors and sixteen teams of two student mentors. All are given training in how to communicate with students of various backgrounds, how to coach and offer feedback, and how to address cultural differences. The mentors meet with their students on a regular basis, evaluate the PDP projects, and hold consultation sessions at which students can ask for help in staying 'on track.' Student mentors are expected to coach the first-year students to promote individual development, motivate them, and with course-related activities and student life in general. They should look for indications that a student is not making sufficient progress and bring this to the attention of the academic mentor. They initiate and support various activities to create a feeling of belonging and promote teamwork. The academic mentors are expected to provide leadership to the student mentor

teams in the form of advice and coaching, to lead progress-discussion meetings (with both student mentors and the first-year students), and to discuss each student's progress with the program director or program coordinator. If there are any study-related problems, the academic mentor will meet with the student concerned and liaise with the program coordinator.

The success of this pilot project relied on effective preparation and implementation. An appropriate climate was created by developing a good mentor program which was then brought to the attention of staff and students to create awareness and support. Good communication is essential in this respect, and the project initiators actively reached out to both the 'opinion leaders' (such as program directors) and the decision-makers (executive board, senior management, university and faculty councils). During the implementation phase, the emphasis was on appropriate monitoring, feedback, and support. The following paragraphs describe the implementation process that was conducted using the Kotter model, followed by a detailed account of the experimental approach used to evaluate the effect of mentoring.

We used the eight steps of the Kotter change-management model to introduce mentoring within the first-year Bachelor's program.

The Kotter approach

We used the eight steps of the Kotter change-management model to introduce mentoring within the first-year Bachelor's program.

1. *Create a sense of urgency*

One year after the introduction of skills training in the Bachelor's curriculum (worth 12 of the 180 credits required), the vice-dean for education met with the program directors of the Bachelor's programs to discuss the introduction of a mentoring system. This would give voice to the TEP's requirement that every student should feel part of the academic community, with an appropriate level of personal attention from a well-organized mentor team consisting of both staff and (senior) students. Mentoring is particularly important in the first year, when new students find themselves attending classes in large lecture rooms alongside three or four hundred fellow students. At this time, discussions about the implementation of the TEP were also being held with the school and university councils, which comprise both staff and students and are an essential part of the university's governance system. The implementation of any significant change requires reallocation of funding as well as additional investment, and must therefore be approved by the various councils. Of all TEP components, mentoring was the most contentious. Comments included, "A real academic education does not require us to hold a first-year student's hand," "Mentoring is a waste of money," and "The school does not have enough qualified people to act as mentors". The necessity of having mentoring accepted as a way of improving academic performance and the mental well-being

of students – two aspects that greatly influence their success at university – was prompted by a desire to reduce the drop-out rate and the time taken to complete the program (both of which are stipulations of the performance agreements between the university and the Dutch government). There were other, secondary motives. It was felt desirable to increase student's perception of the university's quality (as reported in the annual National Student Survey, an important source of information for young people selecting a university) and to bring Tilburg University's profile more in line with the vision and principles of its founder, Martinus Cobbenhagen (see de Regt and van Lenning, 2017). In view of the recent substantial growth in student numbers, the university's management wished to prevent students feeling 'lost in the crowd' and to minimize the risk of poor performance or dissatisfaction.

2. Form a powerful coalition/leadership team

The vice-deans of education were the most vocal advocates of the TEP and its aims. They gave presentations at various meetings and symposia (such as the Education Bazaar), to the program directors of their respective schools, to strategy meetings, and to the faculty councils. A notable supporter was the program director of the International Business Administration BSc program, who had previously produced his own proposal for a mentoring system based on a Personal-Development Plan.

3. Create a vision for change and a strategy to achieve that change

Mentoring was put forward as a practical way of ensuring that every student at Tilburg feels part of the academic community from the outset. It is seen as an essential component of the Tilburg educational vision. However, doing away with all lectures in favor of small groups of, say, forty students is not feasible. A taskforce comprising the program director, support staff, and students was formed to develop concrete plans for the organization of mentoring sessions, the selection of mentors, and the allocation of adequate resources to the pilot project.

4. Communicate the vision

A proposal setting out the details of the mentoring program was submitted to the faculty council and duly approved. The university's Marketing & Communications team then updated the main website and the prospectuses of the individual programs to include a description of TEP, including the mentoring component. New promotional materials were produced. A dashboard was introduced to visualize the progress of TEP implementation, while internal communications devoted considerable attention to TEP by means of newsletters, videos, and workshops.

5. Empower action

A key proposal included in the vision for change was to run a well-designed pilot project in one of TISEM's six Bachelor's programs in order to demonstrate the value of mentoring to students, academic personnel, and the other program directors. The faculty council supported this idea, since the introduction of mentoring in all programs simultaneously was not feasible, given the limited resources, risk of failure, and some remaining skepticism. The

IBA program director was invited to act as project manager for the pilot. He would coordinate all activities and report on progress. Two leading researchers in experimental economics, Daan van Soest and Eline van der Heijden, were asked to set up a field project to evaluate the project's impact. An extensive survey and stakeholder interviews were planned.

6. Create quick wins

The pilot project was extremely visible and had clear evaluation tools, which meant that it was possible to produce a report on the impact of mentoring relatively quickly. The first results of the field experiment were available after only four months (see below), whereupon they were communicated throughout the school and to the university's executive board. The impact assessment was backed by hard scientific evidence, which made decision-making for other programs much easier. The results were also published in the dean's newsletter, and of course circulated among all program directors and the faculty council.

7. Build on the change: conduct a formal evaluation and identify the strengths and weaknesses

Based on the field experiment and the survey results, various improvements were suggested with a view to facilitating the implementation of mentoring in the remaining five Bachelor's programs at the start of the 2018 academic year. Adequate financial and human resources were made available. Training sessions for the new mentors have been held. The in-depth interviews with stakeholders (students, mentors, and support staff) proved very useful in identifying points for improvement, whereupon corrective measures could be taken. After all, in this phase there remains a risk of claiming victory prematurely.

8. Make it stick: imbedding the new approach within the organization

All other program directors are now to introduce a mentoring system in their respective programs, based on improved implementation plans. Further evaluations will be performed to determine whether the impact is comparable to that of the pilot project. We can already state that mentoring has become part of the student experience.

Evaluation using a field experiment

The pilot project was concerned with the introduction of a mentoring system based on a Personal-Development Plan. After one semester, this 'PDP program' was subjected to rigorous scientific evaluation using state-of-the-art methods drawn from the field of experimental economics (van Soest et al., 2018). Specifically, a randomized control trial (RCT) was performed to measure the effectiveness of the program by comparing the study performance and personal development of the students taking part against those of a valid control group (see Figure 5). Randomization is essential since it is difficult to identify a 'valid' control group. Participation in the PDP program is voluntary; a direct comparison of the performance of students who opted to take part against that of students who did not would not provide an accurate assessment of the program's impact. The students who decided to participate are likely to differ from those who did not in many respects – some apparent, others less so. It could be, for example, that the participants are more ambitious than their non-participating counterparts. They may have a higher intrinsic motivation to succeed on

the IBA program. Let us suppose that the participant group achieved higher grades. Is their success the result of having taken part in the PDP program, or is it because they are simply more motivated and more ambitious? In short, students who decided not to take part in the program do not form a valid control group for those who did.

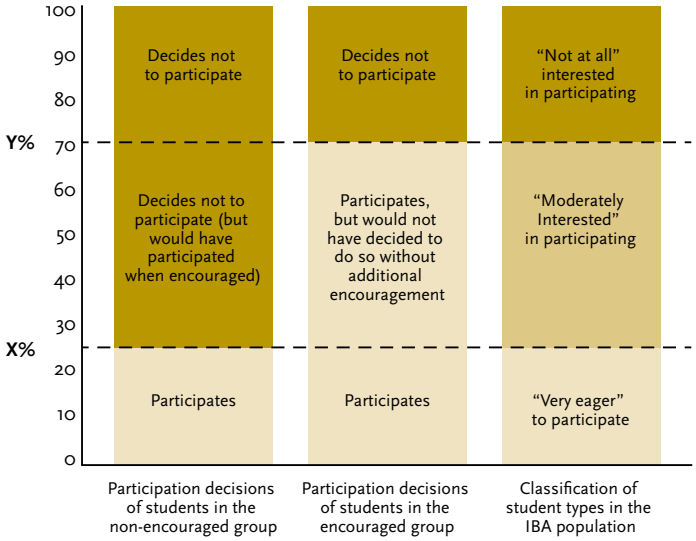


Figure 5: Identification of the various student groups based on participation decisions: 'encouraged' and 'non-encouraged' (van Soest et al., 2018)

To arrive at an unbiased assessment of the project's impact, the following methodology was applied. All students in the 2017 IBA cohort were given information about the mentoring project and its intended (or likely) benefits. In addition to this information, a randomly-selected subgroup of students were given extra encouragement to take part in the form of targeted 'advertising.' They were, for example, invited to view a marketing video showing the benefits of taking part. A randomized selection means that any difference in average study performance between the two groups can only be attributed to the additional encouragement that resulted in a greater percentage of the 'encouraged' group opting to take part compared to the remainder of the cohort. This difference is therefore an accurate and unbiased indicator of the impact of the PDP program on the performance of students who only decided to take part after extra encouragement. It is important to note that this experimental approach does not measure the impact of the program among those students who would opted to take part anyway, being the most enthusiastic or ambitious. For these students the 'basic' message was already appealing enough, whereupon it is not possible to distinguish performance gains due to participation in the PDP program from those which are attributable to all other factors. It should be obvious that this experimental approach does not allow us to draw any conclusions regarding the performance of students who opted not to take part in the PDP program at all.

The reported results therefore relate to the group of 'moderately interested' students, i.e. those in the 'encouraged' group who decided to take part in the project, while their fellow students in the 'non-encouraged' group did not. From an educational perspective, this may actually be a very important (if not the most important) segment of the cohort: the group of students who stand to gain most from the program.

Results

Examination of the figures reveals that the additional encouragement activities were successful in the sense that the participation rate of 52% among the 'encouraged' group is significantly higher than the 29% among those who were only given the standard information. This is not only important from the perspective of this study, it also provides an indication of the general level of interest in the PDP system: somewhere between a third and a half of students have at least some interest in voluntary participation.

The results of our analysis show that the PDP program had a significant impact on the study performance of the 'moderately interested' students, although more in the short term than in the medium-to-long term. In the six subjects that were subject to assessment during the first half of the fall semester, the estimated impact of the PDP program on the results of the 'moderately interested' students ranged between one and three full grade points. The null hypothesis of there being no impact can therefore be rejected (at the level of 10% or better) for five out of the six midterm assessments. Results in the second half of the fall semester are more divergent. In the four course modules with a final examination, the estimated impact of the PDP program on the results of the 'moderately interested' students varies between 0.5 and three grade points. For two of the four exams, the null hypothesis can be rejected (at the level of 10% or better). A comparison of the estimated impact of the two sets of exams reveals that the impact of the PDP program is smaller in three out of four of the final exams than in the mid-term tests. The exception is Mathematics 1 (reckoned to be among the most challenging modules of the IBA program's first semester), for which the impact of PDP is actually greater (see Figure 6).

The PDP program also changed students' attitudes with regard to several important aspects, including the way in which they should plan and organize their study activities. The students in the 'encouraged' group became more confident that they would complete the IBA program within the allocated three years. They became more inclined to believe that hard work, rather than luck or destiny, determines life outcomes. They were more confident that they would achieve their target income level than members of the 'non-encouraged' group, even though both groups had similar career ambitions. Students in the 'encouraged' group were also more likely to report having set some academic goal in the recent past than those in the 'non-encouraged' group. Van Soest et al. hypothesize that setting academic goals is a key determinant of better study performance.

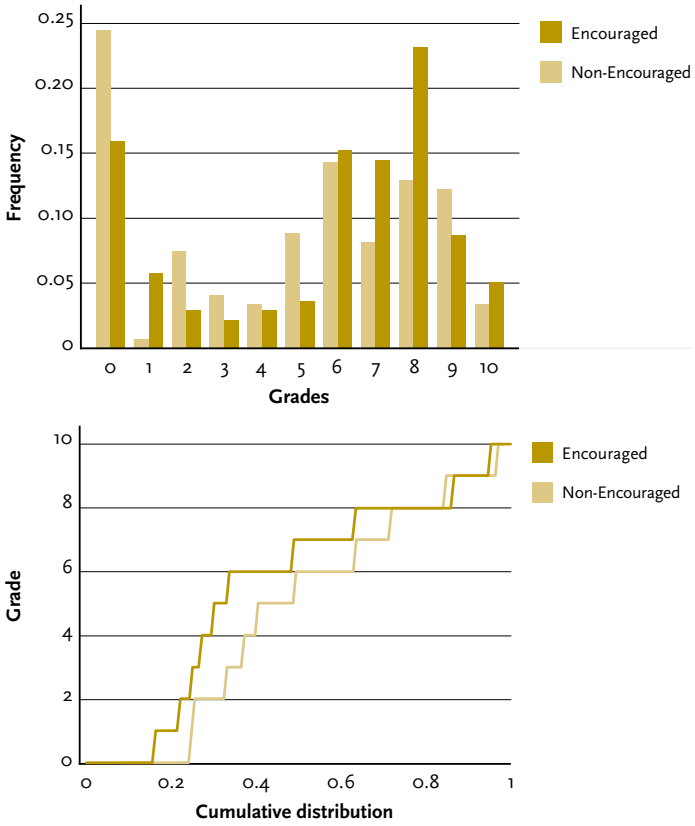


Figure 6: The impact of mentoring on grades in mathematics examinations: encouraged vs. non-encouraged students

The central question of this essay is how innovation in higher education can be encouraged and nurtured. In Part 1, we asserted that innovation is essential. A university that fails to innovate will no longer be able to prepare its students to play their part in our rapidly changing society. In Part 2, we contended that innovation in higher education is not only necessary but feasible. Universities can learn from the experiences of other types of organization, and from organizational theory, although it is of course essential to bear the special character of the university in mind. Provided the right approach is applied, it becomes possible to create a climate in which educational innovation will thrive. Will this happen at Tilburg University? In the third and final part of this essay, we draw on the lessons presented thus far as we examine a recent initiative at Tilburg University: the creation of the Tilburg Education Innovation Laboratory (EUDiLAB), as part of the DEEP program. EDUiLAB is intended to accelerate the pace of innovation. Will it live up to expectations?

PART III

HOW CAN TILBURG UNIVERSITY CREATE AND SUSTAIN A CULTURE OF INNOVATION?

8

The Education Innovation Lab

In this final part of our essay, we set out how Tilburg University is profiling itself as an adaptive organization, able to meet the changing demands of students, prospective students, and society at large. We describe how the introduction of the Tilburg Education Innovation Lab (EDUiLAB) creates an ambidextrous organization and a culture in which innovation can be pursued and sustained without adversely affecting the existing educational processes.

During the development of the Tilburg Education Vision, it became very apparent that innovation in education would be essential (de Regt and van Lenning, 2017). The Kotter change-management model, as discussed in Part 2, lends itself very well to the processes this entails. A ten-strong task force (six members of the teaching staff, two students, and two policy staff), led by a vice-dean of education, advised that educational innovation could best be stimulated by setting up a separate entity, which was given the working title Education Innovation Lab, or EDUiLAB for short (Joos, 2016). This idea was in keeping with the concept of 'ambidexterity,' whereby the existing organization of educational programs and processes would be preserved alongside a separate innovation arm with its own budget, premises, and resources. EDUiLAB began operations in September 2018.

EDUiLAB is a key component of the overall change strategy, under which everyone involved in teaching students is to be encouraged to pursue innovation in education. This creates a situation that is termed 'contextual ambidexterity,' in which every instructor combines efficiency in education with innovation. In other words, it is not only the organizational structure which becomes ambidextrous, but every individual working within it. EDUiLAB is seen as transformative: a vehicle through which the desired innovation culture can be created and sustained. In the first instance, it serves the supply side of educational processes – the instructors and the administrators such as program directors, vice-deans of education, and the university's central executive. Through them, it also serves the stakeholders of educational processes: students and society. They are the beneficiaries of educational innovation, and the ultimate arbiters of its success.

Five core activities

EDUiLAB is led by an academic director and has its own small team of staff. It also draws input from other university personnel involved in innovation, with the innovation coordinators from each school playing a prominent role.

EDUiLAB focuses on five core activities:

1. *Training*

A team of educational-innovation coaches runs workshops and one-to-one training sessions to help instructors acquire new (digital) skills. Professional support is essential if staff are to master new technologies or make full use of new education rooms. Many instructors feel apprehensive about adopting new methods or working in an unfamiliar setting. This is particularly apparent when there is some large-scale introduction of new technology which affects all instructors, such as a new online learning-management system (LMS). Many of the potentially valuable features of an LMS will go unused without adequate coaching, whereupon instructors could be working very inefficiently or denying their students the opportunity to benefit from new teaching and learning methods. Another example of an innovation that requires support is the 'connected classroom,' in which advanced video technology enables the instructor to teach several groups of students at various locations simultaneously. When this technology was first introduced on the Tilburg campus, full-time support was needed to help instructors set up simultaneous lectures with their colleagues in other countries. There are many aspects that require attention, from the technological 'nuts and bolts' such as ensuring a reliable connection and the correct use of cameras and microphones, to more administrative matters such as the design and scheduling of the lectures (particularly if some students are in an entirely different time zone). All are essential to the success of the connected lecture concept. One of the most significant training requirements, however, is with regard to 'blended learning,' the combination of online instruction forms and the more traditional face-to-face contact. Instructors are given coaching in how to record video lectures and their 'knowledge clips,' and how these can be flexibly interwoven with the contact sessions and group projects in the classroom.

2. *Experimentation*

We have stated that an innovation culture must allow opportunities for experimenting with new technologies and new forms of teaching and learning. If a new approach does not produce the desired results, no blame should attach to the instructor. It is OK to get it wrong, but please share your experiences. Experimentation in the EDUiLAB context is designed to help instructors develop their ideas and arrive at an implementation method that allows the effects of the innovation to be measured in a scientific way. In Part 2, we discussed the introduction of mentoring for first-year students. The pilot project was evaluated using methods drawn from the field of experimental economics. It is important to ascertain what works, and especially to ascertain what does not and why. EDUiLAB offers advice and liaises with the schools to ensure that the instructor is given adequate time and resources to devise, develop, and implement an innovation project. Extra time is a precondition of successful

innovation. The LAB will also call upon the expertise available on campus to help in setting up and running innovation projects.

3. Learning Analytics

Innovators wish to develop a better understanding of the teaching and learning process. This entails collecting data about students' learning needs and study behavior. There is already an immense body of data that reveals how and when students use online course materials. Instructors can use these data to supplement their own observations and evaluations to determine which aspects of the program students find more difficult, or which require more detailed explanation. Data collected using learning analytics also enables instructors to give individual feedback, although they must of course comply with the applicable privacy legislation. EDUiLAB is now supporting teaching staff by collecting and analyzing relevant data, but there are others who benefit from learning analytics: students, program directors, and senior management, for example. Learning analytics supports evidence-based teaching and may have far-reaching implications for teaching practice and the management of educational processes. Based on a thorough analysis of the data, it becomes possible to adapt course modules and programs more quickly, perhaps 'on the fly,' i.e. while still in progress. The LAB also calls upon the research expertise present within the university and the Jheronimus Academy of Data Science. In addition, EDUiLAB enables Tilburg University to make a significant contribution to the Acceleration Plan for Educational Innovation with ICT, a national four-year program with a marked learning analytics component (SURF, 2018).

4. Innovation

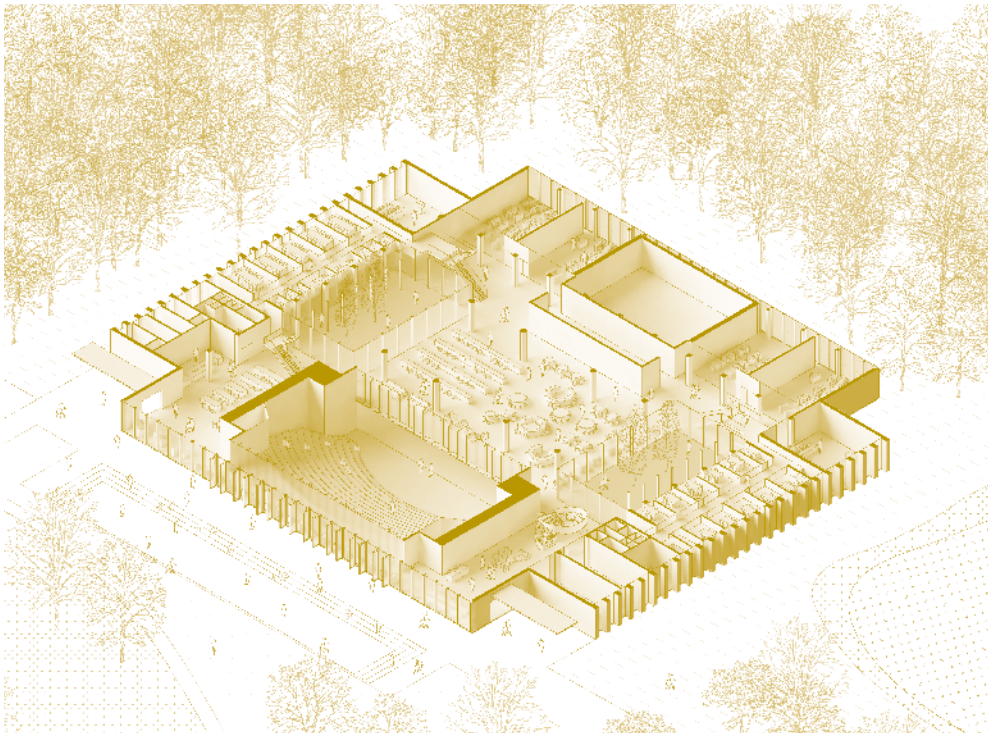
EDUiLAB initiates and coordinates innovation projects, providing advice and access to funding. Through the targeted use of expertise, financial resources, technology, and specially designed classrooms (in the new CUBE building – see picture), the LAB both accelerates and disseminates innovation in education. In the first instance, EDUiLAB will focus on incremental innovations: the optimization of existing programs for existing target groups. In the longer term, it will also develop more radical forms of innovation, including new programs and methods, perhaps for entirely new target groups. The LAB is ideally positioned to do so since one of its specific tasks is to identify significant external developments, particularly those to which conventional educational processes are unable to respond.

5. Communication

Good communication is a *sine qua non* of successful innovation. Communication which involves actively listening to each other's wishes, requirements, and suggestions creates a firm foundation for better cooperation, whereupon new projects can be developed and implemented more quickly. EDUiLAB is a sort of 'hub' that keeps everyone informed of interesting educational developments (both on campus and elsewhere), as well as funding opportunities for educational innovation. New possibilities are brought to the attention of all instructors and education managers by means of an online portal, monthly newsletters and the 'Teacher Technology Updates.' An ongoing dialogue is maintained by means of lunchtime meetings, workshops, and the annual Education Bazaar, a large-scale event that brings

instructors and students together to share knowledge and experiences about innovations and best practices. It is crucial that bottom-up initiatives are given due attention and that all teaching staff are encouraged to listen to the success stories of their colleagues and counterparts. The innovation coordinators of the various schools play an important role in this respect, working closely alongside their respective management teams. Also important is the prominent location of EDUiLAB in the new education building known as CUBE, which opened its doors in September 2018. Many instructors and students now make use of its facilities every day.

To summarize, EDUiLAB (1) initiates innovations based on its responsibility to identify developments in higher education that are likely to be of vital importance to Tilburg University; (2) accelerates innovations developed within the university (notably by the various schools), and (3) serves as a hub through which internal and external stakeholders can access and share information about all aspects of innovation in education.



The new TiU Education Building, CUBE

How can we sustain innovation?

EDUiLAB is an important step towards a truly ambidextrous organization which devotes sufficient attention to educational innovation while maintaining the efficient structure of its existing processes. Ultimately, however, we can only claim success if educational innovation is supported by the entire university community, and when all students and society at large derive the full benefits of innovation.

Successful long-term ambidexterity demands an evaluation cycle that is long enough to assess the value of innovation projects and ensure their thorough implementation. EDUiLAB supports this process. In many cases, pilot projects are used to introduce some innovative element to a course or program, whereupon a positive evaluation prompts the roll-out to other courses and programs. This approach means that it will often take at least two full academic years to implement the innovation. Attempting to fast-track the process increases the risk of insufficient support and hence failure.

It is essential that any innovation enjoys the support of the university's senior management: the executive board and the deans and vice-deans of the various schools. Support for EDUiLAB not only demands the implicit approval of its activities but access to the necessary funding and manpower. The development stage for EDUiLAB coincided with the university's strategic planning cycle for the period 2018-2021. EDUiLAB could therefore claim the full support of those involved in strategic planning, both academic staff and management. The decision to locate EDUiLAB in CUBE should be interpreted as a strong indication that educational innovation is here to stay: it has been imbedded within the organization. Similarly, the link between innovation and the new education rooms – connected and collaborative classrooms and the DAF Augmented Reality Lab) is very evident.

Nevertheless, a broad innovation 'push' supported by every member of the teaching staff can only be achieved when the role of education within the university is fully acknowledged. The Strategic Plan 2018-2021 sets out various activities designed to ensure that this is the case. To date, academic appointments and promotions have tended to be overly reliant on research performance. This is now changing, as demonstrated by the requirement that everyone who teaches students holds at least the University Teaching Qualification (UTQ) and is encouraged to take part in the training program leading to the Senior University Teaching Qualification (STQ), in which innovation is a key component. Moreover, the university has introduced the possibility of holding a full-time teaching appointment for a period of four years. Existing staff are expected to devote attention to development and innovation in education. It will, however, take time for the individual schools to adopt the university-wide policy in full.

We are confident that EDUiLAB represents an important first step towards the creation of a sustainable innovation culture at Tilburg University, one that will fully support the educational vision of 'Knowledge, Skills, and Character.' Our institution will apply this culture of innovation to mold its students into 'Tilburg University-shaped professionals.' Sustainable innovation in education will allow Tilburg University to prepare young people to rise to the societal challenges of today and tomorrow.

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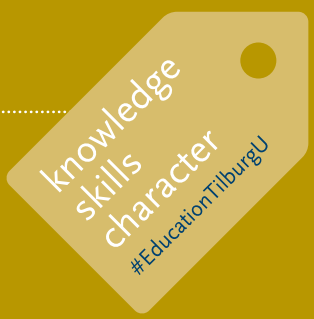

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